

Name: Solution

Simplify each expression. Give each answer without negative exponents.

1. $x^{11} \cdot x^2 = x^{13}$	2. $(x^{11})^2 = x^{22}$	3. $y^{-3} = \frac{1}{y^3}$
4. $x^{11} \cdot x^{-2} = x^9$	5. $\frac{x^{11}}{x^2} = x^9$	6. $\frac{x^2}{x^{11}} = \frac{1}{x^9}$
7. $\frac{x^{11}}{x^{-2}} = x^{11} \cdot x^2 = x^{13}$	8. $y^{-3} = \frac{1}{y^3}$	9. $\frac{1}{y^{-3}} = y^3$
10. $17w^{-5} = \frac{17}{w^5}$	11. $8^{-1}k^4 = \frac{k^4}{8}$	12. $(7m^3)^2 = 49m^6$

<p>13. <math>(3a^2)^3 = 27a^6</math></p>	<p>14. <math>(3a^{-2})^3 = 27a^{-6}</math>  <math>= \frac{27}{a^6}</math></p>	<p>15. <math>(3a^{-2})^{-3} =</math>  <math>= 3^{-3} \cdot a^6</math>  <math>= \frac{a^6}{3^3}</math>  <math>= \frac{a^6}{27}</math></p>
<p>16. <math>3^x + 3^x = 2 \cdot 3^x</math></p>	<p>17. <math>3^x \cdot 3^x = 3^{2x} = 9^x</math></p>	<p>18. <math>k^x \cdot k^y = k^{x+y}</math></p>
<p>19. <math>(3a^{-4})^{-3} = 3^{-3} a^{12}</math>  <math>= \frac{a^{12}}{3^3}</math>  <math>= \frac{a^{12}}{27}</math></p>	<p>20. <math>3r \cdot 8r^3 = 24r^4</math></p>	<p>21. <math>mn^3 \cdot 10n^2m^6 =</math>  <math>10m^7n^5</math></p>
<p>22. <math>(3a^2b^5)^4 = 81a^8b^{20}</math></p>	<p>23. <math>\frac{y^8 \cdot y^6}{y^{11}} = \frac{y^{14}}{y^{11}} = y^3</math></p>	<p>24. <math>\frac{y^{-8}}{y^{-11}} = y^{-8} y^{11}</math>  <math>= y^3</math></p>

<p>25. <math>5k^{-5}p^7 \cdot 2^3k^8p^{-7} =</math>  <math>5 \cdot 2^3 \cdot k^{-5} \cdot k^8 p^7 \cdot p^{-7}</math>  <math>5 \cdot 8 k^3 p^0</math>  <math>40 k^3</math></p>	<p>26. <math>(3v^3)^4 \cdot (5v^5)^2 \cdot v =</math>  <math>3^4 v^{12} \cdot 5^2 v^{10} \cdot v</math>  <math>81 v^{12} \cdot 25 v^{10} \cdot v</math>  <math>2025 v^{23}</math></p>	<p>27. <math>2 \cdot 6^2 + 3 \cdot 4^3 =</math>  <math>2 \cdot 36 + 3 \cdot 64</math>  <math>72 + 192</math>  <math>264</math></p>
<p>28. <math>(13t^9h^{-11})^0 = 1</math></p>	<p>29. <math>\frac{y^3z}{z^5y} = \frac{y^2}{z^4}</math></p>	<p>30. <math>2 \cdot 2^4 + 2 \cdot 2^{-5} =</math>  <math>2^5 + 2^{-4}</math>  <math>32 + \frac{1}{2^4}</math>  <math>32 + \frac{1}{16}</math>  <math>32\frac{1}{16}</math></p>
<p>31. <math>x^4 + x^2 + 2x^4 + 3x^2 + x^5 =</math>  <math>x^5 + 3x^4 + 4x^2</math></p>	<p>32. <math>x^4 + x^2 + y^4 + y^2 + z =</math>  already simplified</p>	<p>33. <math>3x^3 \cdot 5y^2 \cdot 2z =</math>  <math>30x^3y^2z</math></p>
<p>34. Simplify <math>16^{\frac{1}{2}} = 4</math></p>	<p>35. Simplify <math>16^{\frac{-1}{2}}</math>  <math>\frac{1}{16^{\frac{1}{2}}}</math>  <math>\frac{1}{\sqrt{16}}</math>  <math>\frac{1}{4}</math></p>	<p>36. Simplify <math>16^{\frac{3}{2}}</math>  <math>(16^{\frac{1}{2}})^3 = 4^3 = 64</math></p>

<p>37. Simplify <math>8^{\frac{2}{3}}</math></p> $(8^{\frac{1}{3}})^2 = 2^2 = 4$	<p>38. Simplify <math>27^{\frac{4}{3}}</math></p> $(27^{\frac{1}{3}})^4 = 3^4 = 81$	<p>39. Simplify <math>10^0</math></p> $1$
<p>40. Simplify <math>10^1</math></p> $10$	<p>41. Simplify <math>10^{-1}</math></p> $\frac{1}{10}$	<p>42. Simplify <math>10^3</math></p> $1000$
<p>43. Write <math>\sqrt[3]{y}</math> in exponential form</p> $y^{\frac{1}{3}}$	<p>44. Write <math>\sqrt{y^5}</math> in exponential form</p> $(y^5)^{\frac{1}{2}} = y^{\frac{5}{2}}$	<p>45. Write <math>\sqrt[4]{y^3}</math> in exponential form</p> $(y^3)^{\frac{1}{4}} = y^{\frac{3}{4}}$
<p>46. True or False</p> $  \begin{aligned}  (2x)^{\frac{4}{3}} &= ((2x)^4)^{\frac{1}{3}} \\  &= (16x^4)^{\frac{1}{3}} \\  &= \sqrt[3]{16x^4} \\  &= 2x\sqrt[3]{2x}  \end{aligned}  $ <p> <math>\sqrt[3]{16x^4} = \sqrt[3]{8 \cdot 2 \cdot x^3 \cdot x} = 2x\sqrt[3]{2x}</math> </p>		